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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/887,665	01/12/2000	KOJI MINAMI	0925-0154P	9884

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EXAMINER	
YENKE, BRIAN P	

ART UNIT	PAPER NUMBER
2614	

DATE MAILED: 09/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/887,665	MINAMI ET AL.	
	Examiner	Art Unit	
	BRIAN P. YENKE	2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Amendment (28 July 2004)*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-16 and 18-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-16 and 18-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's arguments filed 28 July 2004 have been fully considered but they are not persuasive. See the newly added limitation in the rejection of claims 11 and 18 below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11-16 and 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunzman et al., US 6,054,832 832 in view of Hewlett et al, US 5,812,303 and applicant's admitted prior art.

In considering claims 11-12 and 15;

a) the claimed light source... is met by lamp 14 (Fig 1)

b) the claimed light-transmitting filters... is met by color wheel 18 which includes a respective blue, red, green and clear (white) (50, 54) color segments (Fig 4)

c) the claimed light valve... is met by spatial light modulator 28 (Fig 1)

e) the claimed a signal converter portion to control said white light-transmitting filter using a control signal is met by timing and electronics 24 which gives operating instructions and communicates with sensor board 22 and motor 20 (Fig 1, col 3, line 23-33).

However, Kunzman remains silent on which filter (white, non-white) is used in displaying information corresponding to the higher-order and lower-order bits of digital data (e,f).

The integrated value of the transmissivity of the white (clear) filters is less/smaller than the values of the blue, green and red filters, as can be illustrated by color wheel 18 where the clear segments only account for a fractional portion of the entire color wheel (Fig 4).

Kunzman does disclose a color wheel 18 which includes clear filter segments (50,54) which are used to increase the color efficiencies (col 2, line 15-35) and to control the brightness for all areas of the image, making dark areas appear correctly, while not washing out the bright areas (col 3, line 11-21), where the clear (white) filters are used to properly transmit the correct colors at the proper timing, where the clear segment is used to transition properly between segments (col 4, line 38-44). Kunzman also discloses a color wheel 18 which includes a blue, green and red segment (Fig 4).

The examiner incorporates, Hewlett et al., US 5,812, 303 which discloses the use of NDF (neutral density filter) for each color (RGB), where the NDF filter is used in conjunction with the respective color (RGB) segment. The NDF segment is used to display the lower order bit thereby increasing the minimum amount of time for display of the lower significance bits (col 2, line 9-14) while displaying the most significant bits with the RGB filters, which allows more bits per sample in the display images and produces images with fewer artifacts and images that more closely match that of conventional display systems (col 2, line 9-18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify, Kunzman which discloses an electronically programmable color wheel which includes clear filter segments to control the brightness of all areas of the image and to properly transmit the correct colors at the proper time, with Hewlett, by incorporating neutral density filters into the color wheel, to display an image with fewer artifacts, and increasing the number of bits available for display.

However, the combination of Kunzman and Hewlett does not specifically disclose/discuss (g) a value which is obtained by integrating the value of a transmissivity in a visible range of the white-filter being smaller than the combined integrated values of the non-white filters, nor (h) the brightness created by a first grey level represented via the white light-transmitting filter is ½^m (where m is the number of lower order bits) the brightness created by a first gray level represented via said non-white light-transmitting filters.

Kunzman does disclose a color wheel where the clear segments (50,54) only occupy a small fraction of the entire color wheel. Thus the non-clear segments occupy the majority of color wheel 18 and would provide an integrated value of transmissivity larger than the non-clear segments if computed.

Hewlett discloses a color wheel which utilizes neutral density filters (clear segments) which discloses the use of NDF (neutral density filter) for each color (RGB), where the NDF filter is used in conjunction with the respective color (RGB) segment.

Also, as disclosed by applicant's admitted prior art, Fig 2, (page 7, 1st paragraph; page 10, 3rd paragraph, page 11, 1st paragraph) a color wheel with filter segments Crd,

Cgd, Cbd of lower transmissivity to increase the grey scale of the image data, where the filter segments Crd, Cgd and Cbd have a transmissivity of 1/8 (where m^3 is the number of lower order bits) of their respective filters Cr, Cg and Cb. The filter segments Crd, Cgd, and Cbd, are used to increase the grey scale (brightness) of the displayed image.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Kunzman and Hewlett, which discloses a display system which utilizes clear/white segments in a color-wheel to increase the efficiency and brightness of a displayed image, with applicant's admitted prior art, which would produce a value (as claimed) where the value of the clear (white) filter is less than the non-clear (white) filters (R,G,B), since the clear filter segments are used to enhance the color/brightness of a displayed color image (not a black-white image).

In considering claims 13,

*The claimed wherein if brightness required by the input data...*is met by Kunzman Which utilizes the clear (white) segments of the color wheel 18 to adjust the dark states/areas of the image and the brightness state/area of the image (col 3, line 11-22, line 59-67 to col 4, line 1-9).

In considering claim 14,

Kunzman does not specifically disclose a spatial light modulator that reflects. Kunzman discloses a spatial light modulator (light valve) which is used to (transmit) the display received image data onto a display.

The use of a spatial light modulator such as a digital micro-mirror device (DMD) is a well-known type of modulator which transmits/reflects image data by either being in

the on/off state, which increase the overall efficiency of the display system, by decreasing dead/lag times between color-changes.

As disclosed by applicant Fig 2, Page 2, line 20, the use of a DMD device is a conventional light valve which is used to display image data, where the DMD device is either in an Off or On state.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kunzman, which discloses an electronically programmable color wheel to increase the efficiency of the displayed image, by eliminating transitions between colors and increasing brightness, with a conventional light valve's such as a DMD which is used to increase the efficiency of a displayed image.

In considering claim 16,

Kunzman does not specifically disclose/discuss a value which is obtained by integrating the product of spectral transmission factor of the white light filters and the spectral luminous efficiency with respect to wavelength being less than the sum of values of the non-white filters in the calculation.

However, as disclosed by applicant's admitted prior art, Fig 2, a color wheel with filter segments Crd, Cgd, Cbd of lower transmisstivity to increase the grey scale of the image data, where the filter segments Crd, Cgd and Cbd have a transitivity of 1/8 their respective filters Cr, Cg and Cb. The filter segments Crd, Cgd, and Cbd, are used to increase the grey scale (brightness) of the displayed image.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Kunzman, which discloses a display system which utilizes clear/white segments in a color-wheel to increase the efficiency and brightness of a displayed image, with applicant's admitted prior art, which would produce a value (as claimed) where the value of the clear (white) filter is less than the non-clear (white) filters (R,G,B), since the clear filter segments are used to enhance the color/brightness of a displayed color image (not a black-white image).

In considering claims 18-19,

a) the claimed decomposing light from a light source into a plurality of colors, one of plurality of colors being white is met where the light from light source 14 is decomposed into a plurality of colors via color 18 (Fig 1) where the color wheel includes a clear segment (50, 54) for decomposing the light into the white color

b) the claimed controlling a white-light transmitting filter of a set of filters with a control signal is met by timing and electronics 24 which gives operating instructions and communicates with sensor board 22 and motor 20 (Fig 1, col 3, line 23-33).

c) the claimed displaying information is met where the image created by the array of individual elements on the array is displayed (col 3, line 46-48)

d) the claimed projecting said plurality of colors from said set of filters is met by projection optics 30 (Fig 1).

However, Kunzman remains silent on displaying information corresponding to the higher-order and lower-order bits of digital data (b,c)). Kunzman does disclose a color wheel 18 which includes clear filter segments (50,54) which are used to increase the

color efficiencies (col 2, line 15-35) and to control the brightness for all areas of the image, making dark areas appear correctly, while not washing out the bright areas (col 3, line 11-21), where the clear (white) filters are used to properly transmit the correct colors at the proper timing, where the clear segment is used to transition properly between segments (col 4, line 38-44). Kunzman also discloses a color wheel 18 which includes a blue, green and red segment (Fig 4).

The examiner incorporates, Hewlett et al., US 5,812, 303 which discloses the use of NDF (neutral density filter) for each color (RGB), where the NDF filter is used in conjunction with the respective color (RGB) segment. The NDF segment is used to display the lower order bit thereby increasing the minimum amount of time for display of the lower significance bits (col 2, line 9-14) while displaying the most significant bits with the RGB filters, which allows more bits per sample in the display images and produces images with fewer artifacts and images that more closely match that of conventional display systems (col 2, line 9-18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify, Kunzman which discloses an electronically programmable color wheel which includes clear filter segments to control the brightness of all areas of the image and to properly transmit the correct colors at the proper time, with Hewlett, by incorporating neutral density filters into the color wheel, to display an image with fewer artifacts, and increasing the number of bits available for display.

However, the combination of Kunzman and Hewlett does not specifically disclose/discuss a value which is obtained by integrating the value of a transmissivity in

a visible range of the white-filter being smaller than the integrated values of the non-white filters.

Kunzman does disclose a color wheel where the clear segments (50,54) only occupy a small fraction of the entire color wheel. Thus the non-clear segments occupy the majority of color wheel 18 and would provide an integrated value of transmissivity larger than the non-clear segments if computed.

Hewlett discloses a color wheel which utilizes neutral density filters (clear segments) which discloses the use of NDF (neutral density filter) for each color (RGB), where the NDF filter is used in conjunction with the respective color (RGB) segment.

Also, as disclosed by applicant's admitted prior art, Fig 2, (page 7, 1st paragraph; page 10, 3rd paragraph, page 11, 1st paragraph) a color wheel with filter segments Crd, Cgd, Cbd of lower transmissivity to increase the grey scale of the image data, where the filter segments Crd, Cgd and Cbd have a transmissivity of 1/8 (where m^3 is the number of lower order bits) of their respective filters Cr, Cg and Cb. The filter segments Crd, Cgd, and Cbd, are used to increase the grey scale (brightness) of the displayed image.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Kunzman and Hewlett, which discloses a display system which utilizes clear/white segments in a color-wheel to increase the efficiency and brightness of a displayed image, with applicant's admitted prior art, which would produce a value (as claimed) where the value of the clear (white) filter is less than the combined non-clear (white) filters (R,G,B), since the clear filter segments are used to enhance the color/brightness of a displayed color image (not a black-white image).

In considering claims 20-21,

As stated above, with respect to independent claims 11 and 18, Kunzman does not explicitly disclose the use of higher-order, lower-order bits in the system.

Kunzman does disclose a color wheel 18 which includes clear filter segments (50,54) which are used to increase the color efficiencies (col 2, line 15-35) and to control the brightness for all areas of the image, making dark areas appear correctly, while not washing out the bright areas (col 3, line 11-21), where the clear (white) filters are used to properly transmit the correct colors at the proper timing, where the clear segment is used to transition properly between segments (col 4, line 38-44). Kunzman also discloses a color wheel 18 which includes a blue, green and red segment (Fig 4).

Kunzman also discloses that the segments on the color wheel are controlled by timing and electronics 24 which gives operating instructions and communicates with sensor board 22 and motor 20 (Fig 1, col 3, line 23-33).

The examiner incorporated, Hewlett et al., US 5,812, 303 which discloses the use of NDF (neutral density filter) for each color (RGB), where the NDF filter is used in conjunction with the respective color (RGB) segment. The NDF segment is used to display the lower order bit thereby increasing the minimum amount of time for display of the lower significance bits (col 2, line 9-14) while displaying the most significant bits with the RGB filters, which allows more bits per sample in the display images and produces images with fewer artifacts and images that more closely match that of conventional display systems (col 2, line 9-18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify/utilize in Kunzman, the clear segment to display the lower order bits and the RGB filters to display the higher order bits, where each filter segment is controlled respectively via timing and electronics 24 (thus being different control signals), to control the brightness of all areas of the image and to properly transmit the correct colors at the proper time, with Hewlett, by incorporating neutral density filters into the color wheel, to display an image with fewer artifacts, and increasing the number of bits available for display.

In considering claim 22,

The claimed wherein said signal converter portion includes input terminals for receiving non-white light signals and a brightness signal calculating unit for calculating the brightness of the non-white light signals is met where Kuna discloses is where the timing and control 24 determine how much brightness is added during the clear segment based upon receiving a signal is video, typically which is YUV and computer/or graphics data which is typically RGB (col 3, line 59-65).

In considering claim 23,

The claimed a drive device coupled to said signal converter portion for creating control signals for controlling the light transmitting filters and light valve is met sensor board 22 and motor 20 which are given operating instructions and communicate with the system timing and control electronics 24 (col 3, line 23-33).

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Yenke whose telephone number is (703) 305-9871. The examiner work schedule is Monday-Thursday, 0730-1830 hrs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's Supervisor, John W. Miller, can be reached at (703)305-4795.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist). Any inquiry of a general nature or

relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703)305-HELP.

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General information brochures can also be obtained in person from the Patent Search Room located in Crystal Plaza 3, Room 1A03, 2021 South Clark Place, Arlington, VA 22202.

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BRIAN P. YENKE
Primary Examiner
Art Unit 2614

B.P.Y
30 August 2004